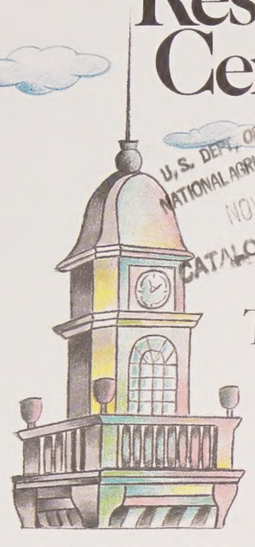
Beltsville Agricultural Research Center



The Farm

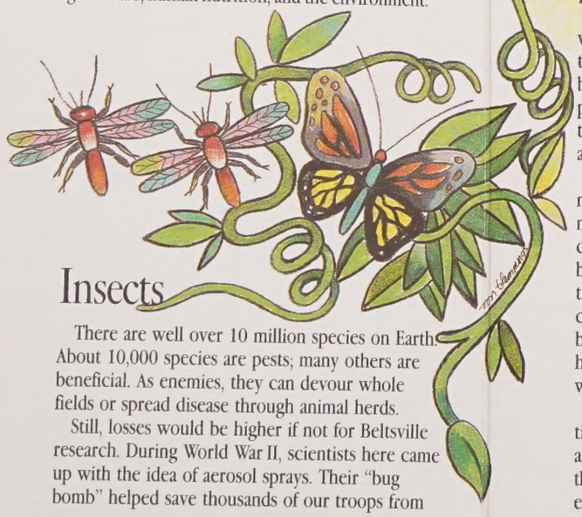
The American people own the 7200-acre Beltsville Agricultural Research Center. It is a working farm and an experimental one, surrounded by suburban Washington, DC. From the air, the center looks like a 9-mile-long, 4-mile-wide quilted blanket of green fields, pastures, and orchards. Look closer and you'll see chicken and turkey houses, cattle barns, and equipment sheds. Then you'll notice herds of cattle, sheep and hogs.

Since 1910, Beltsville scientists have been working to make sure that the Nation has enough healthful food.

The center is now the headquarters of the Agricultural Research Service (ARS), the main research agency of the U.S. Department of Agriculture. ARS has laboratories at 127 locations across the country and 7 overseas.

Beltsville itself is the world's most prominent center of agricultural sciences. Some of its best-known research accomplishments are the modern turkey, hog, blueberry, and strawberry and disease-resistant potatoes.

Drawn by its ideal location and outstanding reputation, some of the Nation's best scientists come to Beltsville to work on solving tough problems in agriculture, human nutrition, and the environment.



Insects

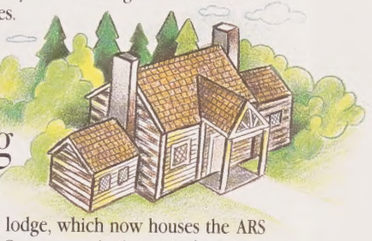
There are well over 10 million species on Earth. About 10,000 species are pests; many others are beneficial. As enemies, they can devour whole fields or spread disease through animal herds.

Still, losses would be higher if not for Beltsville research. During World War II, scientists here came up with the idea of aerosol sprays. Their "bug bomb" helped save thousands of our troops from malaria and other insect-carried diseases. As is typical of Beltsville scientists, their success put them in a position to probe far beyond man's knowledge of insects and go right to the heart of the problem. They decided to attack the enemy's strength: insects' explosive power to reproduce.

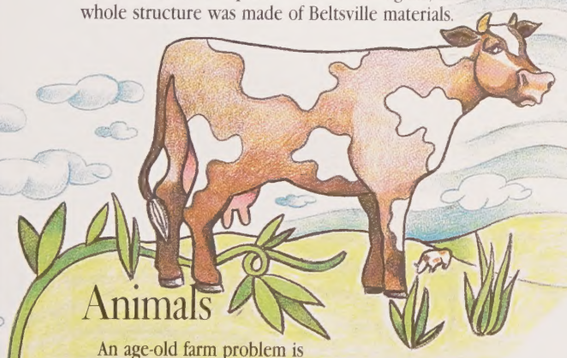
Beltsville scientists have now discovered many of the chemicals given off by female insects to attract males. They have also found molting hormones that make insects become sexual adults and bits of brain chemicals that control growing up. Such research has led to a new generation of bug traps, pest-monitoring devices, and nonchemical controls. Around the Center, an odd assortment of gadgets, even fly traps shaped like cows' heads, are testing grounds for trapping insects or tricking them out of the mating mood.

Also, scientists here are testing environmentally safe fungi, bacteria, or viruses that make specific insects sick. And they test-release good insects to attack harmful ones.

The Log Lodge



Beltsville's log lodge, which now houses the ARS National Visitor Center, was built in 1936-37 by members of the Civilian Conservation Corps, a Depression-era employment program. After setting up a sawmill on site, the CCC built the lodge with the straightest and tallest trees from all over the Beltsville farm. Except for hardware and glass, the whole structure was made of Beltsville materials.



Animals

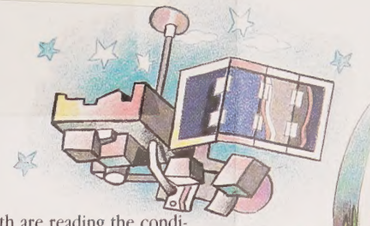
An age-old farm problem is the need to treat diseases and control parasites that harm cattle, pigs, sheep, and poultry.

At Beltsville, scientists are, for the first time, developing a new class of powerful vaccines against the diseases. They are working with special antibodies that when mass-produced help find and fight parasites in the bloodstream. These monoclonal antibodies are also being used in new, highly sensitive and accurate tests for certain animal diseases.

Another Beltsville team years ago found out how much of a cow's feed helps her make a gallon of milk. Their studies began in 1950 on cows in air-conditioned chambers with windows. The chambers, still used in research, help farmers blend feeds that bring good profits and are good for cattle. The chambers electronically count every calorie eaten by a cow. They show how much energy goes into her milk, body tissue, movements, heat output, and wastes.

And, in 25 years of hog breeding, Beltsville scientists have cut hog back fat from over 5 inches to an average of less than an inch. A side benefit is that the hogs are longer. Better hogs today yield two extra porkchops and two extra spareribs.

Agricultural Satellites



Satellites circling the Earth are reading the conditions of crops and weather and will soon be measuring snow cover, landslope, soil erosion, and a dozen other important environmental features.

Small reference points on the ground help scientists use the data. At Beltsville, references for crop readers in space are gardenlike squares of corn, wheat, soybeans, and sorghum.

Satellites receive visible and invisible lightwaves reflected off crops. Computers on Earth then draw pictures from signals sent by the satellites. The pictures help scientists predict crop yields worldwide, information that can be used to make marketing plans based on surpluses and shortages. Also, scientists are using other data provided by satellites to write computer programs that can help predict many factors that affect crops, such as moisture availability and potential spread of diseases and insects.

Biotechnology

Putting living cells and parts of cells to work for people is called biotechnology. Such work has been going on at Beltsville longer than the term has been coined. Today, a new biotech blueprint for future agriculture is being drawn. Modern techniques involve genetic engineering and related techniques.

Researchers are busy finding plant genes that enable crops to use more nitrogen from the air as natural fertilizer. They are engineering genes in test plants so that future crops will grow on dry or salty land. They are learning how living cell membranes are constructed in plants, so that by shifting a few "building blocks," they can produce crops that can tolerate cold, resist drought, insects, and diseases, or have fruit that ripens all at the same time.

A visit to the Beltsville Agricultural Research Center can mean a look into the past and into the future all at once. The Center is a large part of research tradition that had had very positive impact on the Nation and the world. Today, biotechnology at Beltsville has a strong influence on research for the food and agriculture industries in the future.

The Library

The National Agricultural Library, the tallest building on the Beltsville Agricultural Research Center grounds, houses 1.9 million books and bound periodicals about agriculture and the sciences important to agricultural research. The largest agricultural library in the free world, it also offers instant access to other major libraries through computer hookups, serves as coordinator and prime resource for a national network of State university libraries, and is the U.S. center for international agricultural information systems.

The Environment

A landscape can look, smell, and feel perfectly normal even where there are unseen dangers to humans, domestic animals, wildlife, and plants. To keep us aware of these dangers, Beltsville scientists design tools that can detect pollutants in the air, water, and soil as part of the effort to make sure that farming is neither the source nor the victim of pollution.

In one test field, a 10-foot-diameter plastic cylinder holds soybean plants—experimental plants to measure effects of air pollution on crops. Elsewhere on the farm, a trailer is hauling a special on-the-farm unit that breaks down pesticide wastes. And behind a greenhouse, a spinning disk that looks like a pizza pan gathers fog droplets to help researchers measure chemical residues in the air.

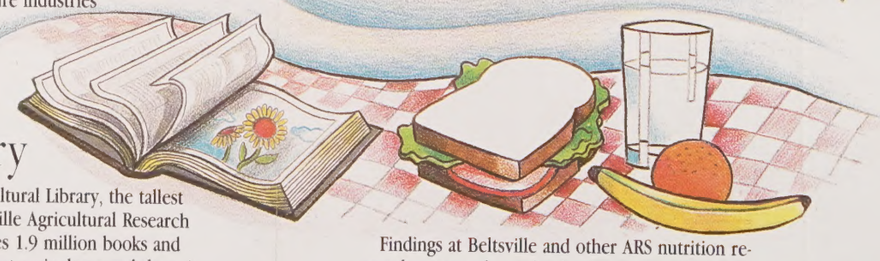
Environmental scientists at Beltsville also develop safer pesticides, computer models to help farmers stop fertilizer runoff from fields, and safe ways to dispose of toxic wastes.

Human Nutrition

In research on health, Beltsville is on the side of an ounce of prevention. Heart diseases, some types of cancer, diabetes, obesity, gout, hypertension, osteoporosis, and other problems are related to nutrition. Scientists here take the lead in finding changes in the diet that keep people healthy and may postpone illness.

Watching the American diet is a tough job. Different bodies adjust in different ways to dietary changes. One tool to make the job easier is a special box, big enough for a person to live in. This special laboratory is a human calorimeter, which gives the best measure yet of how a body turns food into energy.

Another laboratory, with cafeteria-style dining, serves test diets to as many as 40 human volunteers at once. Effects of fats, fiber, sugars, salt, high or low intake of certain minerals and vitamins—all are tested on human subjects after years of preliminary studies on animals.



Findings at Beltsville and other ARS nutrition research centers show clearly that proper diet can stretch the peak of health, cut down trips to the doctor, and slow down diet-related diseases of the middle-aged and elderly.

A Food and Nutrition Information Center at the National Agricultural Library offers information on special diets, based on research, for people with nutrition-related conditions.

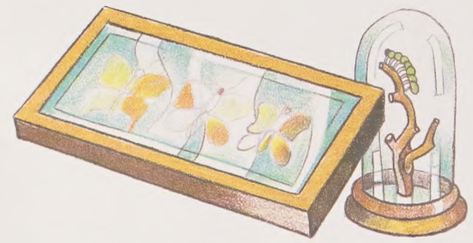
Collections

Agricultural research requires precise knowledge of what insect, fungus, parasite, soil microbe, plant variety, or breeding line of livestock the researcher is dealing with.

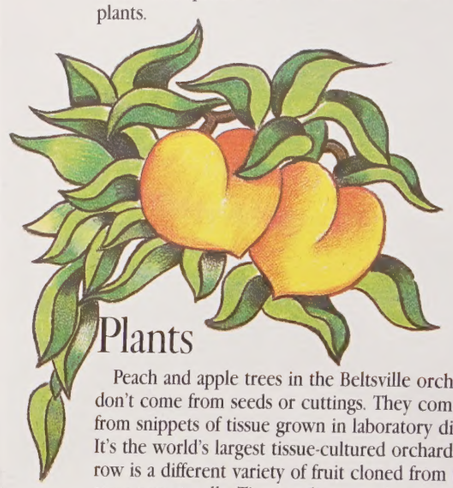
While studying living things, Beltsville scientists have gathered some of the best reference collections in the world. They respond daily to requests for proper identification of specimens that come from researchers here and overseas.

Many of the Beltsville's collections are the largest or among the largest in the world, including:

- The National Fungus Collection.
- The U.S. National Parasite Collection.
- The Systematic Entomology Collection at Beltsville and Washington, DC, which ARS manages in cooperation with the Smithsonian Institution. It holds over 28 million preserved specimens of insects and mites.



Beltsville is also in charge of a computerized national database on plant germplasm. This database holds descriptions of over a half million seeds and plants.



Plants

Peach and apple trees in the Beltsville orchard don't come from seeds or cuttings. They come from snippets of tissue grown in laboratory dishes. It's the world's largest tissue-cultured orchard. Each row is a different variety of fruit cloned from the same parent cells. Tissue culture produces fruit trees three to five times faster than do cuttings. And, the trees are healthier.

Tissue culture also speeds the effects of genetic engineering of plants. Any gene change in a petunia or wheat cell, for example, can be cloned into thousands of plants. So far, gene engineering has produced test plants that can tolerate drought, have higher protein, or resist diseases.

Another strength of Beltsville plant scientists is tailoring crops to soils. The idea is to get genes into crops that help them fit soils, rather than trying to use fertilizers to fit soils to crop varieties.

Some scientists here work on food for the soul—beautiful plants. Besides getting new flowers to the horticultural farms, the research benefits all plant studies. Understanding how petunias grow can often help scientists understand potatoes or other important crop plants.

Beltsville Agricultural Research Center

Visitors may take a guided tour of the Center during regular working hours: Monday through Friday 8:00 am to 4:30 pm

Tours are by appointment only. To arrange for your visit, call or write:
(301) 344-2483 (301) 344-2403

ARS National Visitor Center
Building 302, BARC-East
Beltsville, MD 20705

The best way to visit the Center is by automobile or chartered bus; the Visitor Center, where tours begin, is some distance from public transportation stops.

Visitors should make their own meal arrangements. There are a number of restaurants and snack bars near the Center along U.S. Route 1.

U.S. Department of Agriculture
Agricultural Research Service
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